(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 424 490 A1

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 158(3) EPC

(43) Date of publication:
02.06.2004 Bulletin 2004/23

(21) Application number: **02751805.9**

(22) Date of filing: **30.07.2002**

(51) Int Cl.[7]: **F02M 35/10**

(86) International application number:
PCT/JP2002/007745

(87) International publication number:
WO 2003/014557 (20.02.2003 Gazette 2003/08)

(84) Designated Contracting States:
DE FR GB IT

(30) Priority: **02.08.2001 JP 2001234782**

(71) Applicant: **MIKUNI CORPORATION**
Chiyoda-ku, Tokyo 101-0021 (JP)

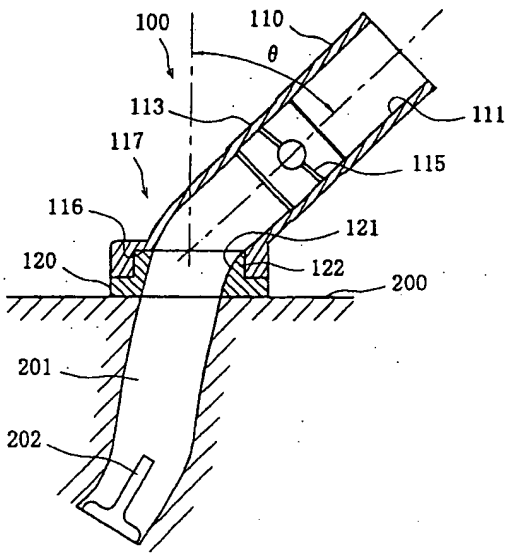
(72) Inventors:
- **HASHIMOTO, Shogo**
  MIKUNI CORPORATION Odawara Br.
  Odawara-shi, Kanagawa 250-0055 (JP)
- **HATSUMI, YOUNOSUKE**
  MIKUNI CORPORATION Odawara Br.
  Odawara-shi, Kanagawa 250-0055 (JP)

(74) Representative: **Beyer, Andreas, Dr.**
Wuesthoff & Wuesthoff,
Patent- und Rechtsanwälte,
Schweigerstrasse 2
81541 München (DE)

(54) INTERNAL COMBUSTION ENGINE INTAKE AIR PASSAGEWAY MEMBER

(57) It is an object of the present invention to provide an intake passage member that can be formed by die casting or injection molding of a synthetic resin which allows the removal of cores from the mold without destruction of the cores even in cases where there is a bent part in the intake passage. The present invention provides an intake passage member for an internal combustion engine comprising a throttle body (intake passage main body part) which has an intake passage that has a bent part, and an insulator which is interposed between the abovementioned intake passage main body part and the internal combustion engine, wherein the intake passage of the abovementioned insulator is extended in the direction in which the intake air flows through, a portion of the bent part of the abovementioned intake passage is formed in the intake passage of the insulator, and the intake passages of both the intake passage main body part and insulator are formed with shapes that allow cores to be removed from the mold. Since the cores can be removed from the mold without destroying the cores, the intake passage member can be manufactured by die casting or injection molding of a synthetic resin.

FIG.1



EP 1 424 490 A1

Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to an intake passage member such as a throttle body, carburetor, intake pipe or the like which feeds intake air or a mixture to the intake valves of an internal combustion engine.

Description of the Related Art

[0002] Fig. 5 is a sectional view which shows a conventional intake passage member 10 attached to the cylinder head or the like of an engine 200. Here, the term "intake passage member" refers to a member that combines a carburetor, throttle body or intake pipe with an insulator. Furthermore, such a carburetor, throttle body, intake pipe or the like will be referred to here as the "intake passage main body part".

[0003] The intake passage member 10 shown in Fig. 5 uses a throttle body 11 as the intake passage main body part. The insulator 12 is used for heat insulation, and is ordinarily made of bakelite. The throttle body 11 has a bent intake passage 13 inside. The throttle body 11 is fastened to the engine 200 via the insulator 12 by means of bolts or the like (not shown in the figures). The intake passage 13 communicates with an intake passage 201 formed on the side of the engine 200, and intake air is intermittently fed into the cylinders by the opening and closing of a valve 202 located at the end of the intake passage 201.

[0004] There may be cases in which a bent part 15 is present in the intake passage 13 as shown in the figures. The reason for this is that it may be necessary because of local restrictions to incline the intake passage by an angle of θ when the intake passage member 10 is attached to the engine 200.

[0005] Conventionally, throttle bodies 11 used as intake passage parts have mainly been manufactured by the die casting of aluminum alloys. Recently, however, throttle bodies made of synthetic resins have begun to be used. In either case, a manufacturing method based on injection molding is used. In the case of injection molding, the intake passage 13 can be formed by inserting a core in the area of the intake passage 13, and removing this core from the mold following injection molding.

[0006] However, if there is a bent part 15 in the intake passage, an area S exists in which the core cannot be removed from either end. Conventionally, the throttle body 11 has been manufactured by casting in such cases. The reason for this is as follows: in the case of casting, the core is formed by sand; accordingly, the core can be removed from the bent part 15 by destroying the core.

[0007] However, if the throttle body 11 is manufactured by casting, there is a conspicuous drop in the manufacturing efficiency; i. e., the casting molds and cores must be manufactured one by one. This requires a significant amount of labor, and leads to the problem of an increase in the manufacturing cost of the throttle body 11.

SUMMARY OF THE INVENTION

[0008] The present invention was devised in order to solve such problems. It is an object of the present invention to provide an intake passage member which allows die casting or injection molding using a synthetic resin by splitting the part S where the removal of a core is impossible into two members, namely a throttle body 11 and an insulator 12, in cases where there is a bent part in the intake passage.

[0009] In order to achieve the abovementioned object, the present invention is an intake passage member for an internal combustion engine comprising an intake passage main body part which feeds intake air or a mixture into an internal combustion engine, and which is equipped with an intake passage that has a bent part, and an insulator which is interposed between the abovementioned intake passage main body part and internal combustion engine, wherein a portion of the bent part of the abovementioned intake passage is formed in the intake passage of the insulator, and the intake passages of both the intake passage main body part and the insulator are formed with shapes that allow the removal of a core from the mold.

[0010] Furthermore, it is also possible to use a construction wherein the shapes of the respective intake passages that are formed in the abovementioned intake passage main body part and insulator are shapes which are such that when the respective cores that form the respective intake passages are formed with a split structure, these cores can be removed from the mold from both ends of the intake passages, or to use a construction wherein the abovementioned intake passage main body part and insulator are connected by the engagement of a projecting part on one of these parts with a recessed part in the other part.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011]

Fig. 1 is a sectional view which shows the intake passage member of the present invention attached to an engine;

Fig. 2 is an enlarge sectional view showing the main body of the throttle body;

Fig. 3 shows the insulator; Fig. 3 (a) is a sectional view along line III-III in Fig. 3 (b), and Fig. 3 (b) is a bottom view;

Fig. 4 shows another insulator; Fig. 4 (a) is a sectional view along line IV-IV in Fig. 4 (b), and Fig. 4

(b) is a bottom view; and
Fig. 5 is a sectional view which shows a conventional intake passage member attached to an engine.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0012] An embodiment of the present invention will be described below with reference to the attached figures. Fig. 1 is a sectional view which shows the intake passage member 100 of the present invention attached to an engine 200. The throttle body 110 which is used as the intake passage main body is fastened to the engine 200 via an insulator 120 by means of bolts or the like (not shown in the figures). An intake passage 111 is formed in the throttle body 110, and a throttle valve 115 is mounted in the intake passage 111 so that this throttle valve 115 is free to pivot.

[0013] In the present invention, the thickness of the insulator 120 (i. e., the length in the direction of flow of the intake air) is greatly increased, and the intake passage 121 [of the insulator 120] is bent. Furthermore, the bent intake passage 121 of the insulator 120 and the intake passage 111 of the throttle body 110 are formed into an integral unit, thus forming an intake passage that has a bent part 117 similar to that shown in the conventional example. As a result, the intake passage 111 can be inclined at the same angle θ as that shown in the conventional example.

[0014] Fig. 2 is an enlarged sectional view of the main body 113 of the throttle body 110. In cases where this main body 113 is manufactured by die casting or injection molding of a synthetic resin, a core is used to form the intake passage 111. However, as is shown in Fig. 2, this is formed in a core shape in which the part S that would not ordinarily allow the removal of a core is split approximately in half between an upper-side core 131 and a lower-side core 132. The upper-side core 131 has a stepped cylindrical shape which is formed with a three-step construction in which the diameter [of the core] gradually becomes smaller in the downward direction, but the central axis is straight. Accordingly, this core can be pulled out of the mold in the direction indicated by a following molding. the lower-side core 132 has a bent part, but can be pulled out of the mold by pulling this core in the direction indicated by b.

[0015] Fig. 3 shows the insulator 120; Fig. 3 (a) is a sectional view along line III-III in Fig. 3 (b), while Fig. 3 (b) is a bottom view. The intake passage 121 is also molded by a core when the insulator 120 is molded; however, in this core as well, as is shown in Fig. 3 (a), the part S that would not ordinarily allow the removal of a core is split approximately in half between an upper-side core 141 and a lower-side core 142. The upper-side core 141 has a curved surface, but can be removed by pulling the core in the direction indicated by c in the figure, while the lower-side core 142 can be pulled out in the direction indicated by d.

[0016] Furthermore, when the throttle valve 115 is attached to the main body 113 of the throttle body 110, and the projecting part 122 of the insulator 120 is inserted into the recessed part 116 formed in the lower end of the main body 113, an intake passage that is bent in the same manner as in a conventional member can be formed by the intake passage 111 of the throttle body 110 and the intake passage 121 of the insulator 120. Furthermore, the formation of a step at the joint between the intake passages can be prevented by engaging the projecting part 122 and recessed part 116.

[0017] As is shown in Fig. 3 (b), the insulator 120 has a flange beneath the projecting part 122, and through-holes 123, 123 for bolts or the like are formed in the protruding parts on both sides of the flange. the lower end of the throttle body 110 also has the same shape, and has through-holes (not shown in the figures). These through-holes and the through-holes 123, 123 are superimposed, and bolts or the like are passed through; fastening is then accomplished by screwing these bolts into female screws formed on the side of the engine.

[0018] Fig. 4 shows another insulator; Fig. 4 (a) is a sectional view along line IV-IV in Fig. 4 (b), and Fig. 4 (b) is a bottom view. This insulator 150 has a shape in which an intake passage 152 is formed in the center of a thick disk 151, and a cylindrical part 153 is disposed around the circumference. The intake passage 152 is bent, and this bend can be formed by splitting the core into an upper-side core 161 and lower-side core 162, and pulling the respective cores out in opposite directions. Four slits 154 are formed in the cylindrical part 153. Furthermore, a pipe (not shown in the figures) which is installed in an upright position in the intake passage on the engine side is inserted and connected to the inside of the cylindrical part 153. Moreover, a portion of the thick disk 151 is engaged and connected with a recessed part formed in the throttle body.

[0019] As was described above, the intake passage member for an internal combustion engine provided by the present invention is an intake passage member for an internal combustion engine comprising an intake passage main body part which feeds intake air or a mixture into an internal combustion engine, and which is equipped with an intake passage that has a bent part, and an insulator which is interposed between the abovementioned intake passage main body part and internal combustion engine, wherein a portion of the bent part of the abovementioned intake passage is formed in the intake passage of the insulator, and the intake passages of both the intake passage main body part and the insulator are formed with shapes that allow the removal of a core from the mold. Accordingly, an intake passage member which has an intake passage that is bent at a desired angle can be manufactured by die casting, injection molding of a synthetic resin, or the like.

[0020] If the abovementioned intake passage main body part and insulator are connected by engaging a projecting part formed on one these parts with a re-

cessed part formed in the other part, the formation of a step at the joint between the intake passages can be prevented.

Claims

1. An intake passage member for an internal combustion engine comprising:

   an intake passage main body part which feeds intake air or a mixture into an internal combustion engine, and which is equipped with an intake passage that has a bent part; and
   an insulator which is interposed between said intake passage main body part and internal combustion engine;

   wherein a portion of the bent part of said intake passage is formed in the intake passage of the insulator, and the intake passages of both the intake passage main body part and the insulator are formed with shapes that allow the removal of a core from the mold.

2. The intake passage member for an internal combustion engine according to claim 1, wherein the shapes of the respective intake passages that are formed in said intake passage main body part and insulator are shapes which are such that when the respective cores that form the respective intake passages are formed with a split structure, said cores can be removed from the mold from both ends of the intake passages.

3. The intake passage member for an internal combustion engine according to claim 1 or claim 2, wherein said intake passage main body part and insulator are connected by the engagement of a projecting part on one of the intake passage main body part and the insulator with a recessed part in the other of these.

FIG.1

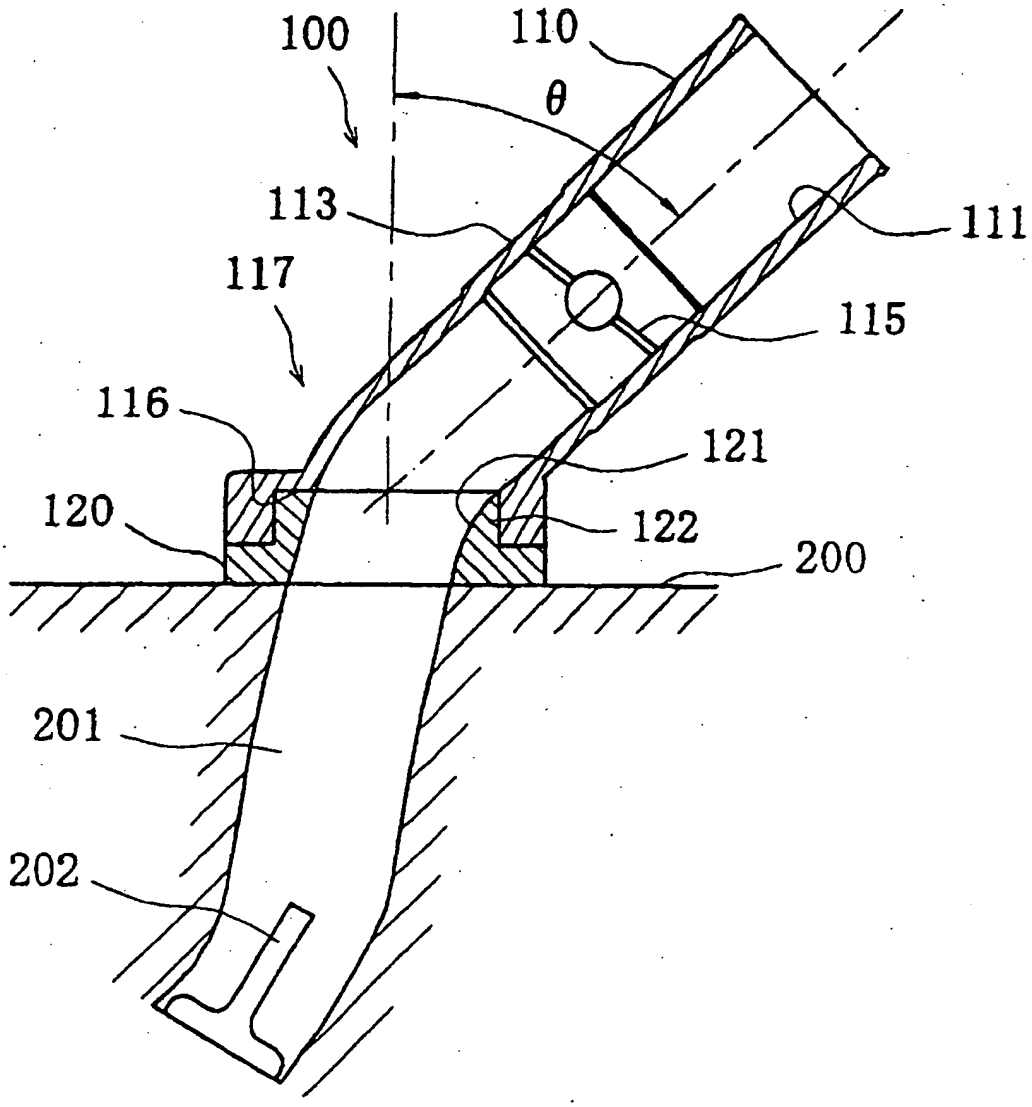


FIG.2

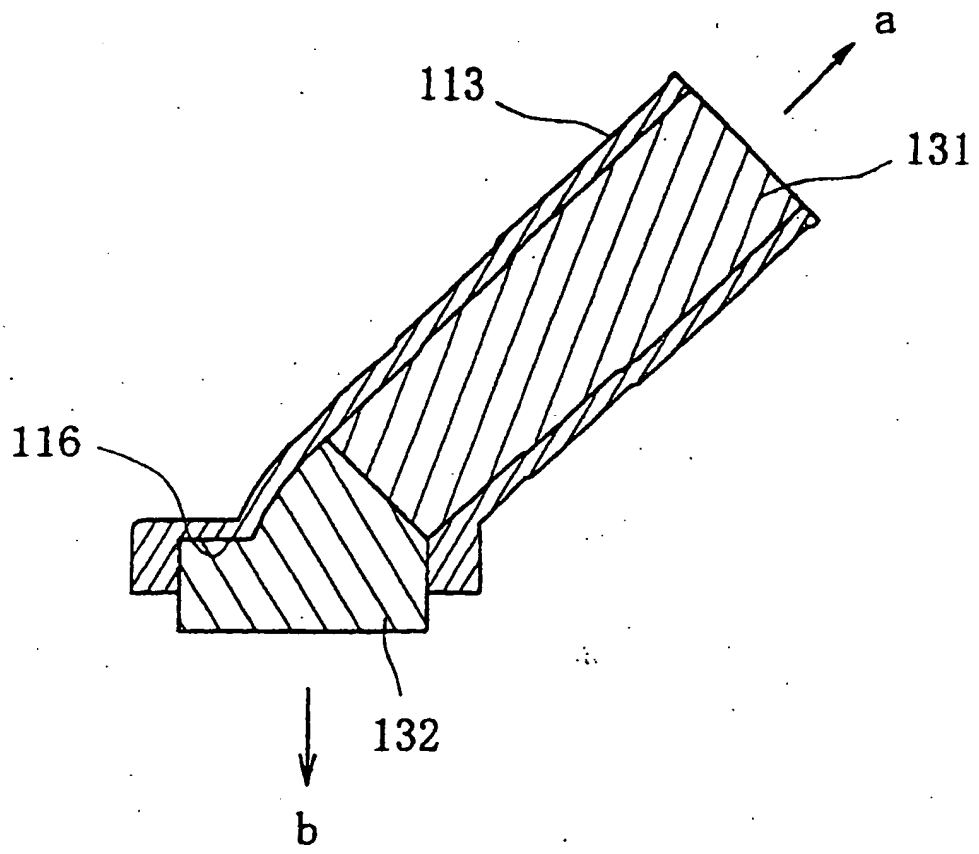
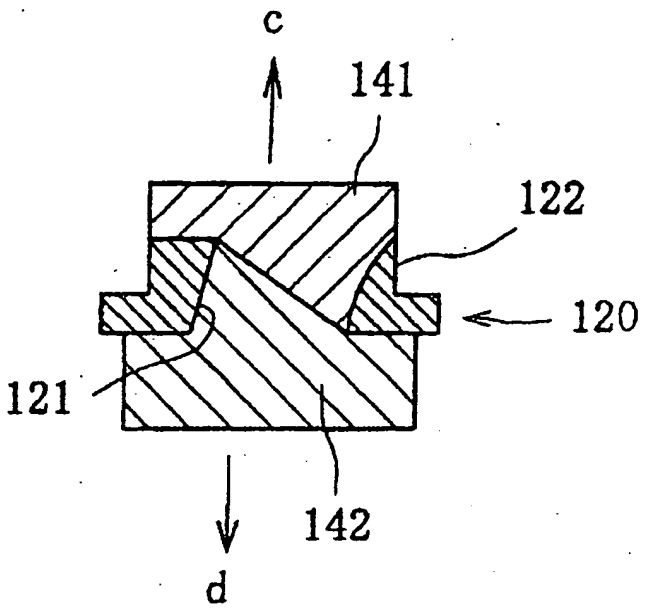


FIG.3

(a)



(b)

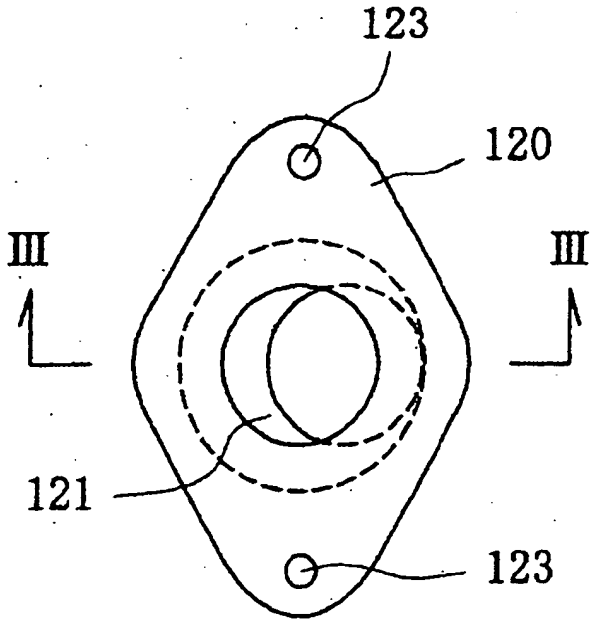


FIG.4

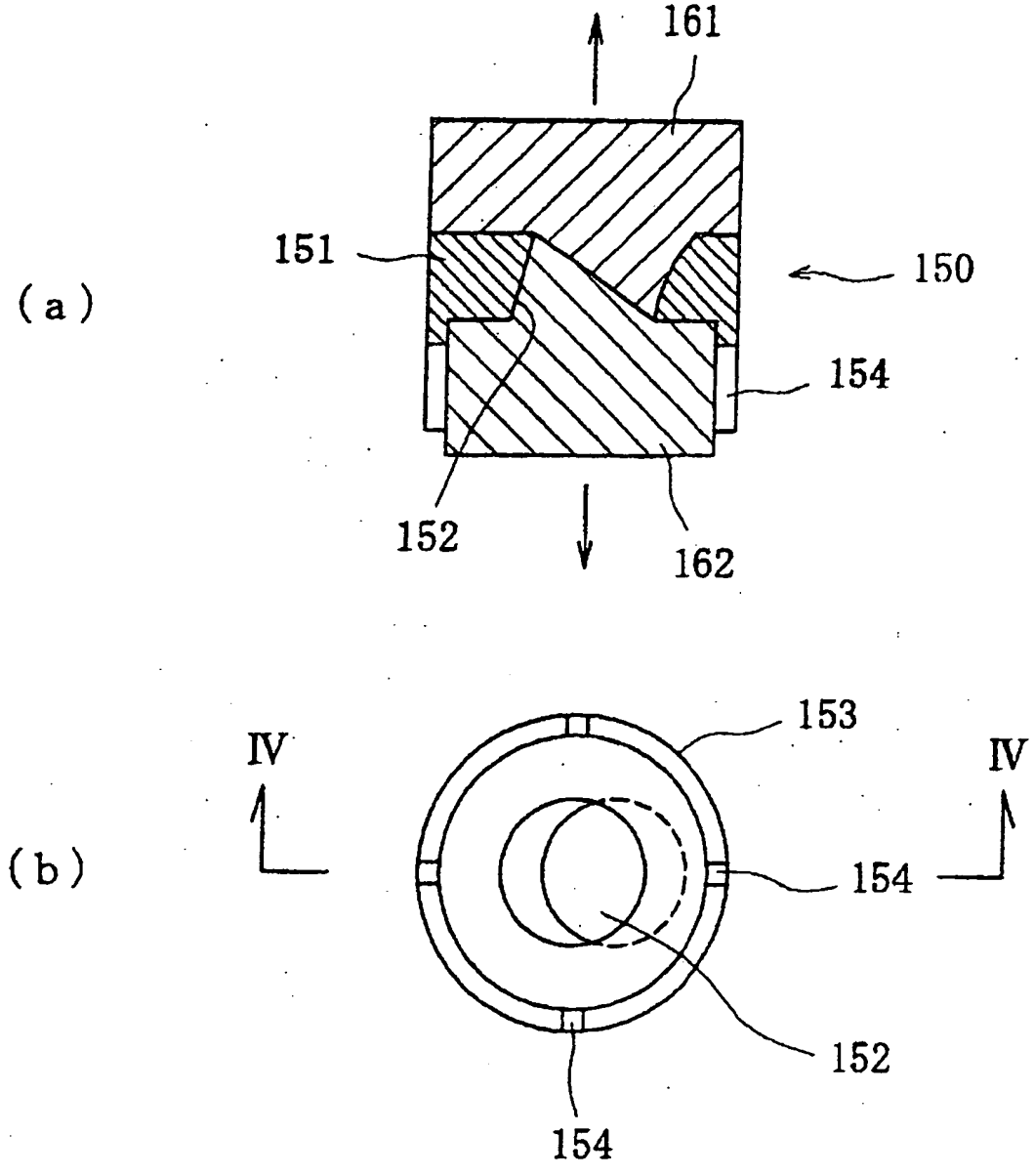


FIG.5